A SURVEY AND INVESTIGATION OF 'STEALTH' CORONAE ON VENUS: DISTRIBUTION, MORPHOLOGY, AND STRATIGRAPHY.

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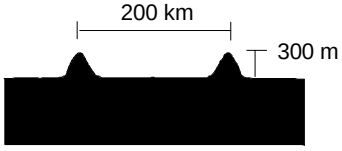
Mapping of the Scarpellini Quadrangle **[1]** was undertaken for the Venus Geological Mapping Project (VMAP) and employed standard photogeological techniques **[2]**. Superposition, embayment of units and cross-cutting structures were studied and mapped, as a contribution to our understanding of the geological evolution of this region. The Scarpellini Quadrangle contains several large coronae that are easily identifiable on Magellan SAR imagery. They are representative of the range of coronae structures found on Venus **[3,4]** and include concentric, concentric ring and radial-concentric coronae **[5]**. They have topography and fracture annuli that positively identify them as coronae.

Scarpellini contains numerous less easily discernible circular structures that are provisionally termed 'stealth' coronae. Although these features are sometimes complex in their topography and structure, most of them lack the complexity of coronae that have already been described **[3,5]**. Initial survey results indicate that stealth coronae are usually circular in plan and between 160 km and 1700 km in diameter. Many of them consist of a circular topographic ridge, approximately 30 km to 50 km across and rising 200 m to 700 m above the surrounding surface (fig. 1), but some more complex forms have been identified. The second schematic diagram (fig. 2) shows the profile of a topographically complex stealth corona.

Figure 1.

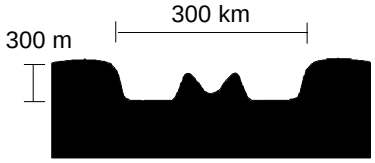


Cross-section of typical stealth corona
Example at 18.0 S, 40.0 E.

Coronae are conventionally features that show two scales of annular deformation. They have an annulus of concentric fractures and/or ridges which are aligned or superimposed upon an encircling topographic rim **[4,5]**. Here the definition of corona is broadened to include features that possess the morphologic characteristics of coronae, such as a topographic rim, but which may lack smaller scale deformation; such as the radar detectable fracture/ridge annulus. 'Stealth corona' is a generic term which implies that these features are difficult to detect using SAR. They are essentially coronae that have subdued or disrupted morphologies, or which were not initially recognised as coronae since they lacked the tectonic annulus that was considered to characterise these structures.

In the Scarpellini region, two large coronae (Ma and Juksakka) exist in materials other than the regional plains units **[1]**. Stealth coronae have also been found to have formed in a variety of geological units, including regional plains materials and lineated and mottled plains materials. This indicates that the features are not confined to a single epoch of Venusian geological evolution.

Figure 2.



Cross-section of complex stealth corona.
Example at 14.0 S, 42.0 E.

A survey of stealth coronae distribution and properties is underway. The survey of stealth coronae records their location, elevation and physiographic parameters including size and morphological characteristics. Framelets from the GTDR are used in addition to SAR data and the synthetic stereo imagery produced by the USGS, which is vital to the description of structural properties and stratigraphy. Survey fields have been designed to enable comparison with earlier coronae work **[5]** both in terms of structure and distribution. Criteria adopted for the identification of stealth coronae are as follows: circular or elliptical features that have an *unfragmented* topographic ridge are required to have 70% of their circumference intact; and features consisting of a *fragmented* ridge must be 50% intact, providing that a circle or ellipse is circumscribed by the ridge segments that are preserved.

The study of stealth corona morphology and of the structures that they contain will allow us to further our understanding of their origin, properties and development. The study of their stratigraphy will be used to place these features in evolutionary context and contribute to our understanding of Venusian resurfacing history. The survey, based on initial findings, is expected to report a two to three-fold increase in the number of corona-like features recorded by previous investigations **[5]**. This will present significant implications for our understanding of the heat budget, interior mechanics and surface processes operating on Venus.

[1] Tapper & Guest, (1997), LPSC XXVIII, this volume, **[2]** Wilhelms, (1972), Geologic Mapping of the Second Planet, U.S.G.S. Interagency Report, **[3]** Stofan, et al., (1991), JGR Vol. 96. p. 20,933-20,946, **[4]** Squyres, et al., (1992), JGR Vol. 97. p. 13,611-13,634, **[5]** Stofan, et al., (1992), JGR Vol. 97. p. 13,347-13,378.